

# NASA TECH BRIEF



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## Transient Analysis Generator (TAG) Simulates Behavior of Large Class of Electrical Networks

The Transient Analysis Generator (TAG) program was designed to provide a means for simulating both transient and dc steady-state behavior of a large class of electrical networks. As a first effort, it comes very close to achieving most of its goals. Not only is a very large class of lumped linear, bilateral, passive networks covered by this analyzer, but a significant number of nonlinear, nonbilateral networks are also capable of being accurately simulated.

TAG is termed an analysis generator because it generates a special analysis program for each circuit described to it. The creation of a special simulation program for each circuit in a programming language that is easily understood and manipulated provides two features that are almost unique to the TAG system. Program readability allows the user to check the actual equations that are generated to simulate the behavior of a particular circuit. These equations appear in symbolic form in matrix format and provide an additional check against errors in the circuit description. Easy manipulation of the simulation program provides unmatched flexibility in the number and type of simulations that can be performed.

The TAG system consists of two basic parts. The first part which actually generates the solution program, is called the generator or preprocessor. The preprocessor interprets the user's circuit description, generates the proper set of simulation equations, and imbeds them in a Fortran solution program. This solution program is unique to the given circuit topology and is available in punchcard form as an output of the TAG system.

The second part of TAG is the execution or simulation system. This system comprises the set of subroutines required to actually run a generated solution program. These subroutines provide the detailed solution and control processes required by the simulation program. While the preprocessor is stored on magnetic tape to be called into use by special control cards, the execution system is stored on cards in relocatable binary form and must be included in all TAG system decks submitted for a simulation run.

Preprocessing and execution may be combined in a single computer run. When run in the one-pass mode, the system provides a simplicity of operation that is advantageous for the beginner.

### Notes:

1. This program uses Fortran II and FAP on an IBM 7094 computer and an SC 4020 plotter.
2. Inquiries concerning this program may be directed to:

COSMIC  
Computer Center  
University of Georgia  
Athens, Georgia 30601  
Reference: B67-10319

### Patent status:

No patent action is contemplated by NASA.

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